An Assessment of Motor Vehicle Emissions in Kuala Lumpur, Malaysia

United States-Asia Environmental Partnership

December 1998

TABLE OF CONTENTS

List of Acronyms

ARB	California Air Resources Board
Cal/EPA	California Environmental Protection Agency
CEP	California Environmental Partnership
MDOE	Malaysia Department of Environment
OBD	on-board diagnostics
US-AEP	United States-Asia Environmental Partnership

EXECUTIVE SUMMARY

In July 1996, a state/federal partnership was established that includes the United States Agency for International Development-led program called the United States-Asia Environmental Partnership (US-AEP), the California Environmental Protection Agency (Cal/EPA), and the California Trade and Commerce Agency. This three-member partnership, titled the California Environmental Partnership (CEP), was established to assist Asian governments in solving environmental problems and to increase environmental technology transfer in the international marketplace. CEP assists Asian governments by deploying technical assistance teams to Asia.

Motor vehicle emissions are the leading cause of air pollution in Malaysia, and the Malaysia Department of Environment (MDOE) is looking for new ways to combat the problem. In 1996, MDOE introduced two regulations to control vehicle emissions, stipulating certain exhaust emission standards for diesel and gasoline vehicles. The regulations will require MDOE to conduct verification tests on the vehicles emissions.

The MDOE submitted a request to the US-AEP Director in Malaysia for a Cal/EPA technical assistance team from the California Environmental Partnership to be deployed to Kuala Lumpur to help MDOE address their vehicle emissions problems.

The two representatives from Cal/EPA's Air Resources Board (ARB) selected to serve on the team were in Kuala Lumpur from March 20 through March 30, 1998. The team attended meetings with MDOE to share ARB's experience with motor vehicle pollution control and standards enforcement. The team was asked to provide technical assistance to MDOE personnel in developing

- an emission measurement capability in a laboratory setting,
- documentation and procedures systems, and
- an inspection and periodic checking system, including maintenance and monitoring systems for motor vehicles.

MDOE also requested the team's assistance in exploring various options for obtaining appropriate U.S. clean technologies and emission-measuring devices.

The team described California's "cradle-to-grave" approach to controlling motor vehicle emissions, starting with ARB's adoption of specific emissions standards for manufacturers designing and building the vehicles, ARB certification of engine families, new vehicle and in-use vehicle testing, smog check, and old-vehicle-scrappage programs.

The team visited a regional vehicle inspection facility and a transit bus fleet maintenance facility. The vehicle inspection site is operated by Puspakom, a private business, under contract to the Malaysian government. The team also visited a transit bus fleet maintenance facility that is operated by Malaysia's largest bus company, MHSB.

Observations

Malaysia's motor vehicle program currently lacks enforcement of certification standards and any in-use inspection/maintenance program. The only currently operating program is a safety inspection and idle emissions test for vehicles used commercially (heavy-duty vehicles, buses, taxis, and other business vehicles). This program affects only about 10 percent of the total vehicle population. There is no inspection program for private vehicles and no enforcement of certification standards through either new or in-use vehicle compliance testing.

Recommendations

Some of the team's recommendations are as follows:

1. Continue to set performance standards, as opposed to prescriptive component fixes (i.e., all cars must have a catalyst). It is better to set a performance standard and allow the manufacturer to decide on the best method for meeting that standard.

2. Set tough in-use inspection and maintenance standards and follow up with testing and enforcement to confirm that the standards have been met.

3. Expand the current centralized inspection/maintenance testing of commercial vehicles to include private vehicles.

4. Restrict the importation of vehicles that do not meet MDOE's emissions standards.

5. Continue efforts to set performance standards that will encourage the improvement of two-stroke engine emissions performance or cause the phasing out of this engine technology. Two-cycle motorcycles appear to be a major source of pollution.

6. Continue development of an elevated metropolitan railway system that will reduce congestion and improve air quality.

Summary

The Malaysia Department of Environment now has a more thorough knowledge of California's motor vehicle program. They will likely use these strategies as a basis for developing their own programs to complement the vehicle certification efforts they already have.

California has many businesses that are directly involved in producing emissions measurement equipment facilities. The Cal/EPA team in conjunction with the California Environmental Partnership will identify those businesses and provide them copies of this report to solicit their interest in working with the Malaysia Department of Environment.

BACKGROUND

Motor vehicle emissions are the leading cause of air pollution in Malaysia, and the Malaysia Department of Environment (MDOE) is looking for new ways to combat the problem. In 1996, MDOE introduced two regulations to control vehicle emissions, stipulating certain exhaust emission standards for diesel and gasoline vehicles. The regulations will require MDOE to conduct verification tests on the vehicles emissions.

All gasoline-fueled motor vehicles contribute to the high ozone levels, especially in Kuala Lumpur which has the greatest concentration of population (and vehicles) in the country. To address these concerns, MDOE recently developed regulations that control light- and heavy-duty vehicle emissions to levels equal to the current California emissions standards. Although there are no standards in effect for motorcycles at present, MDOE is planning to adopt regulations that are based on those in Taiwan.

The MDOE submitted a request to the US-AEP Director in Malaysia for a Cal/EPA technical assistance team from the California Environmental Partnership to be deployed to Kuala Lumpur to help MDOE address their vehicle emissions problems.

The two representatives from ARB selected to serve on the team were in Kuala Lumpur from March 20 through March 30, 1998. These representatives were Donald J. Chernich, Manager of the Northern Heavy-Duty Diesel Section, and William E. McDuffee, Air Resources Engineer with the In-Use Compliance Section of the Mobile Source Operations Division. Mr. Chernich and Mr. McDuffee have over 20 years of combined experience in the development, implementation, and administration of a variety of motor vehicle emissions control programs at ARB. Most notably, their experience includes working with the following:

- cleaner burning diesel fuel and cleaner burning gasoline,
- California's Smog Check Program,
- California's Smoke Check Program for diesel-powered vehicles,
- emissions-testing procedures used for certification of new motor vehicle engines,
- testing of motor vehicles for enforcement recalls, and
- advanced motor vehicle technologies such as on-board diagnostics and electric vehicles.

ARB's Northern Heavy-Duty Diesel Section, of which Mr. Chernich is Manager, is responsible for performing roadside inspections of large diesel-powered trucks in use on California highways. In this capacity, the section staff performs visual and smoke inspections of vehicles at weigh stations and at large company maintenance facilities. Vehicles that fail the inspections are issued citations requiring the repair of the vehicle and the payment of fines.

ARB's In-Use Compliance Section, where Mr. McDuffee is Air Resources Engineer, is responsible for testing emissions of passenger cars, light-duty trucks, medium-duty vehicles, and motorcycles to determine compliance with ARB emissions standards within each vehicle's useful life. To do this, the section procures sets of selected types of vehicles in private use from owners and performs vehicle certification tests on them. The results are then used to determine compliance with California's emissions standards. If a set of vehicles fail in-use testing, the manufacturer is asked to perform a recall to correct the high emissions.

PROGRAM DESCRIPTION

The team attended meetings with MDOE to share ARB's experience with motor vehicle pollution control and standards enforcement. The team was asked to provide technical assistance to MDOE personnel in developing

- an emission measurement capability in a laboratory setting,
- documentation and procedures systems, and
- an inspection and periodic checking system, including maintenance and monitoring systems for motor vehicles.

MDOE also requested the team's assistance in exploring various options for obtaining appropriate U.S. clean technologies and emission-measuring devices.

DESCRIPTION OF ACTIVITIES

The ARB technical assistance team met with Ms. Hajah Rosnani Ibarahim, Director General, MDOE; Mr. Aminuddin Bin Ishak, Principal Assistant Director of Mobile Sources Unit, MDOE; and Mr. Ruslan Mohammed of his staff. Also participating in these meetings were Mr. Lokman Hakim Harun, General Manager of Business Development, and Mr. Abdul Latif Anuar of Puspakom. Mr. Ishak was the project coordinator. The team also met with US-AEP/Malaysia Deputy Director Vivian How.

The team described California's "cradle-to-grave" approach to controlling motor vehicle emissions, starting with ARB's adoption of specific emissions standards for manufacturers designing and building the vehicles, ARB certification of engine families, new vehicle and in-use vehicle testing, smog check, and old-vehicle-scrappage programs. Topics covered included how ARB develops standards, on-board diagnostics (OBD) systems, new vehicle warranties, new vehicle audit testing, in-use compliance testing, inspection/maintenance programs, heavy-duty vehicle roadside smoke inspection, and reformulated gasoline and diesel fuel.

During the course of the week, the team visited a regional vehicle inspection facility and a transit bus fleet maintenance facility. The vehicle inspection site is operated by Puspakom, a private business, under contract to the Malaysian government. The inspectors perform brake efficiency, headlight alignment, and suspension condition tests in addition to emission tests for hydrocarbon and carbon monoxide (gasoline vehicles) and smoke opacity (diesel vehicles). These inspections are mandatory for completing the annual vehicle registration. Although these inspections are a good start, only commercially used vehicles are required to undergo these inspections annually. These vehicles represent only about 10 percent of the vehicle population.

The team also visited a transit bus fleet maintenance facility that is operated by Malaysia's largest bus company, MHSB. MHSB's fleet consists of approximately 250 buses used for city-to-city travel. Their buses are maintained by a strict schedule to prevent mechanical breakdowns and to avoid failing the annual government inspections. The result has been fewer breakdowns, improved fuel economy, and lower emissions.

During the week of meetings, the ARB team presented the following videos:

California Air Resources Board - History of Air Pollution
Car Care for Healthy Air - Smog Check II
On the Road to Clean Air
Cleaner Burning Gasoline
What Technicians Should Know - Cleaner Burning Gasoline
Hughes Remote Emissions Sensor - SMOG DOG
Accelerated Vehicle Retirement - SCRAP
a computer compact disc on California's Ambient Air Quality Data 1980-1996

These videos were left with the host along with copies of all reference materials presented during the meetings.

OBSERVATIONS

Malaysia's motor vehicle program currently lacks enforcement of certification standards and any in-use inspection/maintenance program. The only currently operating program is a safety inspection and idle emissions test for vehicles used commercially (heavy-duty vehicles, buses, taxis, and other business vehicles). This program affects only about 10 percent of the total vehicle population. There is no inspection program for private vehicles and no enforcement of certification standards through either new or in-use vehicle compliance testing.

Broad, sweeping changes, such as fuel reformulation, can be very expensive. They also have the potential to be the most effective. For example, reformulating gasoline is costly to refiners. The benefit to air quality in California, however, was immediate and continuous because every vehicle using it produces fewer emissions.

Clean air is in everyone's best interest. Clean air protects public health and the environment's natural resources, improves business image, and can stimulate the economy (as concern for the environment declines during times of economic strife). Tough environmental policy does not have to be mutually exclusive and contrary to businesses' economic interests.

RECOMMENDATIONS

General

1. Develop a solid, stable funding mechanism in order to provide sufficient staffing, equipment and research capabilities. Air pollution prevention/environmental protection is expensive and the benefits take many years to develop. Motor vehicles appear to be a major contributor to Malaysia's air quality problem. More resources need to be directed to this area.

2. Utilize tough enforcement to encourage and ensure compliance of air pollution regulations. It is better strategy to prevent air pollution than to try and manage it after the fact.

3. Develop a solid monitoring and inventory system. These form a basis for determining the effectiveness of programs and for strategic deployment of resources.

Air Pollution from Cars, Trucks, Buses and Motorcycles

1. Continue to set performance standards, as opposed to prescriptive component fixes (i.e., all cars must have a catalyst). It is better to set a performance standard and allow the manufacturer to decide on the best method for meeting that standard.

2. Utilize remote-sensing technologies (automated or human) to identify the dirtiest segment of the vehicle population, then strive to reduce those excess emissions. A small percentage of heavy pollutant sources can create a significant proportion of the pollution.

3. Set tough in-use inspection and maintenance standards and follow up with testing and enforcement to confirm that the standards have been met.

4. Expand the current centralized inspection/maintenance testing of commercial vehicles to also include private vehicles.

5. Expand the current smoke opacity testing of diesel vehicles to include random roadside locations.

6. Perform functional under-hood inspections of emission control components to identify missing, modified, or disconnected components, and require repair.

7. Support and nurture a competent vehicle-repair industry. Identifying polluting vehicles is worthless if effective repairs are not carried out. All of the above mentioned types of air pollution reductions occur when a vehicle is operating as designed.

8. Restrict the importation of vehicles that do not meet MDOE's emissions standards.

9. Consider market-based strategies to accelerate the turnover of older cars and motorcycles (such programs as "vehicle scrappage").

10. Strive to eliminate lead and benzene in vehicle gasoline, and significantly reduce the sulfur and aromatic content in diesel fuel.

11. Continue efforts to set performance standards that will encourage the improvement of two-stroke engine emissions performance or cause the phasing out of this engine technology. Two-cycle motorcycles appear to be a major source of pollution.

12. Establish a public educational program on how to properly mix the oil and gasoline for two-stroke engines. An alternative would be to create an incentive program to make pre-mixed gasoline available without a significant price differential to regular gasoline.

13. Continue development of an elevated metropolitan railway system that will reduce congestion and improve air quality.

FOLLOW-UP

At the close-out meeting, the following items were requested:

- A Ringleman Opacity Chart
- A copy of an ARB video in the Heavy-Duty Vehicle Inspection Program
- A list of available smoke opacity meters
- A copy of the California Code of Regulations, Title 13
- A book of California environmental statutes and regulations
- Information on how to order the Code of Federal Regulations

In addition, the host also expressed interest in looking into the possibility of obtaining visual smoke evaluation certification.

CONCLUSION

The meetings were successful in that the Malaysia Department of Environment now has a more thorough knowledge of California's motor vehicle program. They will likely use these strategies as a basis for developing their own programs to complement the vehicle certification efforts they already have. California continues to be recognized as the leader in effective emissions control programs when countries, such as Malaysia, seek advice in order to expeditiously implement their own emissions control programs.

California has many businesses that are directly involved in producing emissions measurement equipment and facilities. As countries such as Malaysia enact regulations to reduce emissions from motor vehicles, these California businesses are likely to be producing equipment and software programs for governments enacting such regulations and the companies subject to the regulations. Other California businesses that are involved in producing motor vehicle emissions control components are also likely to be providing their products to the motor vehicle industry in Malaysia and other countries.

ATTACHMENT I

PHOTOGRAPHS